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species, *Pronuba maculata*, *Prodoxus marginatus*, *P. cinerius*, *P. aeneus* and *P. intermedius*), are described, and the paper concludes with remarks which point to these different Yucca Moths as admirable illustrations of the derivative origin of species.

THE WYANDOTTES.

BY MAJOR J. W. POWELL.

The Indians now known as the Wyandottes, were first found on the lower St. Lawrence. Subsequently they inhabited a narrow district of country on the shores of Lake Huron, and were known as the Hurons; later they lived in Michigan about Detroit; then in Ohio in what is known as Wyandotte county; from Ohio they were moved to Kansas and placed on a reservation; and from Kansas to the Indian Territory. In their wanderings from point to point, as they were driven from advancing civilization, a few of their number were left behind, so that the Wyandottes are scattered from the lower St. Lawrence to the Indian Territory along the route of their migration. These Indians call themselves Wundat; the etymology of the word is not known. In their social organization four units are recognized—the family, the gens, the phratry and the tribe. The family, as the term is here used, is nearly synonymous with household. It is composed of the persons who occupy one lodge, or, in their permanent wigwams, one section of a communal dwelling. The head of the family is a woman. The gens is an organized body of consanguineal kindred in the female line. "The woman carries the gens," is the formulated statement by which a Wyandotte expresses the idea that descent is in the female line. Each gens has the name of some animal—the form of such animal being its tutelary god. Up to the time when the tribe left Ohio, eleven gentes were recognized as follows: Deer, Bear, Highland Turtle (striped), Highland Turtle (black), Mud Turtle, Smooth large Turtle, Hawk, Beaver, Wolf, Sea Snake, Porcupine. In speaking of an individual he is said to be a Wolf, a Bear, or Deer, as the case may be, meaning thereby that he belongs to that gens; but in speaking of the body of people comprising a gens they are said to be relatives of the Wolf, the Bear, or the Deer, as the case may be.

There are four phratries in the tribe—the three gentes, Bear, Deer and Striped Turtle constituting the first; the Highland Turtle, Black Turtle and Smooth Large Turtle the second; the Hawk, Beaver and Wolf the third; and the Sea-snake and Porcupine the fourth. The eleven gentes as four phratries constitute the tribe.

The civil government inheres in a system of councils and chiefs. In each gens there is a council composed of four women. These four women councilors select a chief of the gens from its male members; that is, from their brothers and sons. This gentile chief is the head of the gentile council. The council of the tribe is composed of the aggregated gentile councils. The tribal council, therefore, is composed one-fifth of men and four-fifths of women.

The government of the Wyandottes, with the social organization upon which it is based, affords a typical example of tribal government throughout North America. Within that area there are several hundred distinct governments. In so great a number there is great variety, and in this variety we find different degrees of organization, the degree of organization being determined by the differentiation of the functions of government and the correlative specialization of organic elements.

A SIMPLE DEVICE FOR PROJECTING THE VIBRATIONS OF LIQUID FILMS WITHOUT A LENS.

BY H. S. CARHART, A. M., Professor of Physics and Chemistry, Northwestern University, Evanston, Ill.

This instrument is designed to project upon the screen the vibrations of a film of soapy water produced by the voice or by an organ pipe. It might be called the self-projecting phoneidoscope. It differs from Sedley Taylor's phoneidoscope in three particulars: first, the vibrations are commu-

nicated to the film through the agency of a mouthpiece and a ferrotype diaphragm; second, the vibrations are projected on a screen; third, the film is employed to project itself without a lens.

It consists of a wooden tube, having a telephone mouthpiece at one end and expanding into a large funnel at the other, the funnel being of metal. In the side of the tube a stop-cock is inserted. A film is obtained in the open end of the funnel and a little air is then blown through the stop-cock. This distends the film slightly, causing it to act as a convex mirror. It is then placed in a beam of sunlight and reflects it at the proper angle. Upon singing a note at the mouthpiece a sharply defined system of waves is projected. Photographs of these have been taken. Caps fitting into the funnel and provided with a square or triangular opening, are also employed to give films of different shape.

THE LANGUAGES OF THE IROQUOIS.

BY MRS. E. A. SMITH.

The language of each nation represents its thought. If these thoughts have remained unrecorded, it is from the language itself that they must be obtained by tracing out the origin, history and meaning of its words. Each word has its history, which it can be made to reveal by tracing out the origin, history and their most hidden secrets, and the thoughts, customs and beliefs of the originator be read as truthfully as if recorded by the historian's pen. For "words unaided cannot lie;" twenty words in Tuscarora represent supernatural beings. Does this leave a doubt as to the tendency of their minds? The Tuscarora word for burial ground signifies "placed in the ground in a sitting posture," proving that some time in the past such was their method of burial. The very structure of the Indian languages, where the words are so self-explaining, affords unlimited scope to the etymologist in his search into word history. There are two distinct periods in the modern history of the Iroquois. The inundation of new ideas on the advent of the white man introduced almost a new vocabulary, differing according to the ideas of the observers. For instance, the horse when first seen by the Senecas was drawing logs, hence was called a log drawer. Another tribe saw it carrying packs, and termed it pack-carrier. The Tuscaroras adopted the English word and term it *ha-hath*. It is quite remarkable that so few words have been borrowed from the English. And these have become so Indianized by prefixes and appendages or changes in their vowel sounds as to be scarcely recognizable. Among them are: U-ts—oats; Sa-i tar—cider; Ha-hass—horse; Vi-nigair—vinegar; Qui-tair—Peter; Ta-wait—David; Tju-rus—Julius; Nay-yak-it-ando—jacket. Lastly was-tun for Boston, adding to this the plural suffix ha-kah, a term which in English might be interpreted *ites*. We have then Was-tun-ha-kah, or Bostonites, which in the Iroquois is the general term for Americans or the whole American nation. This almost supernatural intuition of the Indian mind crystallizes, I do not doubt, the opinion also and belief of at least 250,000 pale faces residing in the metropolis of Massachusetts. Of the length of some of incorporative words, which sometimes contain verb, subject, object, adjective or preposition, I would remark that the examples generally given in encyclopedias and works on language are almost entirely English Indian. That is, a missionary, perhaps, translating a portion of the Bible, finds some abstract word entirely beyond the comprehension of the Indian mind; he therefore takes Webster's definition of the word and translates that into the Indian in the form of one word until it has the appearance of the heading to a German railway time-table, the words consisting sometimes of forty letters and eleven or twelve syllables. The longest word thus Anglo-Indianized with which I have met is the Mohawk word for stove polish, the word itself being as indicative of the ingenuity of the inventor as the polish itself. It consisted of a glowing description of all the excellencies of said stove polish, which it required fifty-eight letters to express. The abstract nouns, represented as being absent from many of the Indian languages, are found in the Tuscarora, such as life, death, love, hate. An interesting feature of the language also might be traced in the prefer-

ence given to the feminine gender instead of, as in the more ungallant English, to the masculine; for instance, the word theirs translates "two hers." The work I present is necessarily but a chrestomathy compared to what can be done in the study of each of the Iroquois languages. Enough beauties, however, have been discovered through this mere insight to convince one that their possibilities were great. The reflection is, therefore, sad that in all probability fifty years hence these chrestomathies, imperfect as they are, may be the only record of their former existence. Even now English is fast becoming the communicating medium of the people, as it is of the pulpit and the school. We can, therefore, safely predict that within the next century the Iroquois languages, as spoken by its six different tribes, will have become a thing of the past.

STRUCTURE OF MICA VEINS IN NORTH CAROLINA.

BY W. C. KERR.

At Danville, Va., Professor Kerr, of Raleigh, found veins or dykes which seemed to have been filled neither by fused matter nor by the ordinary mode of infiltration, but by a fine granular fragmented mass, derived from the containing bedded rocks, by the crowding, jamming and mechanical comminution of the rocks themselves. The mica veins in North Carolina are simply dykes of very coarse granite. When the crystallization becomes so coarse that the diameter of the mica sheets passes three or four inches, the dyke is called a mica vein. These veins are found in the upper Laurentian or Montalban, and may be considered characteristic of that horizon in North Carolina. The most productive veins are found in the high plateau between the Blue Ridge and the Smoky mountains, mostly in two or three counties. The amount of marketable mica produced per month is not more than two or three tons, although a much larger quantity could be obtained if the market demanded it. The most valuable of the present mica mines were opened and wrought by the mound-builders many ages ago on a much larger scale than now. There are evidences in the great river valleys in North Carolina of extensive glaciation in remote times, although the last glacial period is wholly unrepresented on the present surface. The protrusion of the eastern coast of North Carolina, about a hundred miles beyond the general Atlantic coast, is due to the interaction of the Arctic shore current and the Gulf stream, which collect the detritus thrown into the sea from Maryland to South Carolina, and drop them about Hatteras. This action has carried the coast of North Carolina to within fifty miles of the margin of the deep Atlantic channel, and, therefore, near its limit. The sounds behind the chain of sand islands or dunes, known as "The Banks," are rapidly silted up and converted into marsh and dry land by the sands blown over the dunes, and by the sediment brought down by the numerous rivers from the interior. The movement of the sand of these dunes was found to be about one foot per annum landward.

TRANSFORMATION OF PLANORBIS.

A PRACTICAL ILLUSTRATION OF THE EVOLUTION OF SPECIES.
BY A. HYATT.

The word evolution means the birth or derivation of one or more things or beings from others, through the action of natural laws. A child is evolved from its parents, a mineral from its constituents, a state of civilization from the conditions and surroundings of a preceding age. While evolution furnishes us with a valuable working hypothesis, science cannot forget that it is still on trial. The impatience of many when it is doubted or denied savors more of the dogmatism of belief than of the judicial earnestness of investigation. Every individual differs in certain superficial characters from the parent forms, but is still identical with them in all its fundamental characteristics. This constantly recurring relationship among all creatures is the best estab-

lished of all the laws of biology. It is the so-called law to heredity, that like tends to reproduce like. There seem to be only two causes which produce the variations which we observe; one is the law of heredity, the other is the surrounding influences or the sum of the physical influences upon the organism. The first tends to preserve uniformity, the second modifies the action of the first. The law of natural selection asserts that some individuals are stronger or better fitted to compete with others, in the struggle of life, than are others of the same species: hence they will live and perpetuate their kind, while the others die out. An erroneous impression exists, that Darwinian doctrines are more or less supported by all naturalists who accept evolution, but it is far from the truth. The Darwinian hypothesis is so very easy of application, and saves so much trouble in the way of investigation, that it is very generally employed, without the preliminary caution of a rigid analysis of the facts, and it is safe to say that it is often misapplied. A great amount of nonsense has been written about its being a fundamental law, in all forgetfulness that we are yet to find a law for the origin of the variations upon which it acts; it cannot be the primary cause of the variations, for the laws of heredity are still more fundamental. The speaker then described the situation and character of Steinheim, where numerous shells of the Planorbidae are found in the strata, which have been very regularly deposited. Hilgendorf claims to have discovered great evidences of the gradual evolution of the various forms from the simplest and oldest specimens, but Mr. Hyatt has failed to find what Hilgendorf describes. By means of a lantern a number of illustrations of the shells were projected upon a screen, and quite fully described. Four lines of descendants were shown to branch out from four of the simplest forms, with all the gaps between the species filled with intermediate varieties. Each one of the lines or series has its own set of characteristic differences, and its own peculiar history. It is a fair inference from the facts before us, that the species from the progressive series, which become larger and finer in every way, owe their increase in size to the favorable physical condition of the Steinheim basis. Darwinists would say that in the basin a battle had taken place, which only the favored ones survived. Mr. Hyatt endeavored to present, in a popular manner, the life-history of a single species, the *planorbis levis*, and its evolution into twenty or thirty distinguishable forms, most of which may properly be called by different names and considered as distinct species. He also endeavored to bring the conception that the variations which led to these different species were due to the action of the laws of heredity, modified by physical forces, especially by the force of gravitation, into a tangible form. There are many characteristics which are due solely to the action of the physical influences which surround them; they vary with every change of locality, but remain quite constant and uniform within each.

MOUNDS OF ILLINOIS.

BY W. McADAMS, OTTERVILLE, ILLS.

Mr. McAdams stated that during a period of some 25 years, when leisure permitted, he had been exploring in the mounds of the State. Within a radius of 50 miles from the mouth of the Illinois river there were many thousands of mounds erected by the past inhabitants of the country.

A map was shown illustrating the ancient works of the region, which include almost every variety of mound in the Union. Mr. McAdams has explored hundreds of these mounds, and collected a great quantity of valuable material illustrating the habits and customs of the people of that age. He gave illustrations of House, Burial, Temple and other Mounds.

Many of the small mounds in this section, the speaker thought, were the remains of dwelling places, originally made by placing poles on end, or in a vertical position, fastened at the top, and the whole covered with sod and earth. This structure, after being repaired from year to year, would finally decay, fall to pieces and form a mound. In many of these mounds he had found ashes, remains of animals eaten, and other articles that would be found in